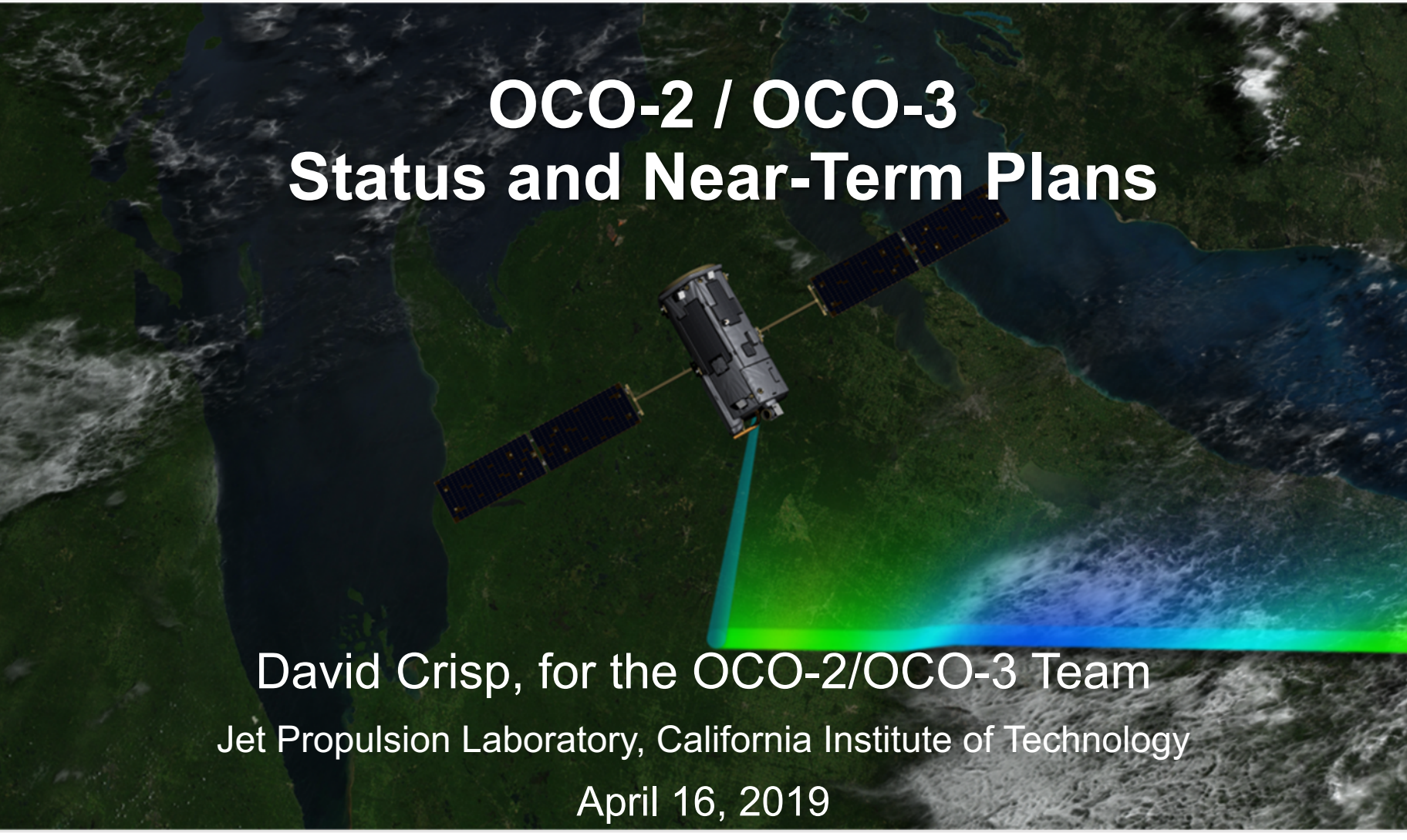


OCO-2 / OCO-3
Status and Near-Term Plans

David Crisp, for the OCO-2/OCO-3 Team

Jet Propulsion Laboratory, California Institute of Technology

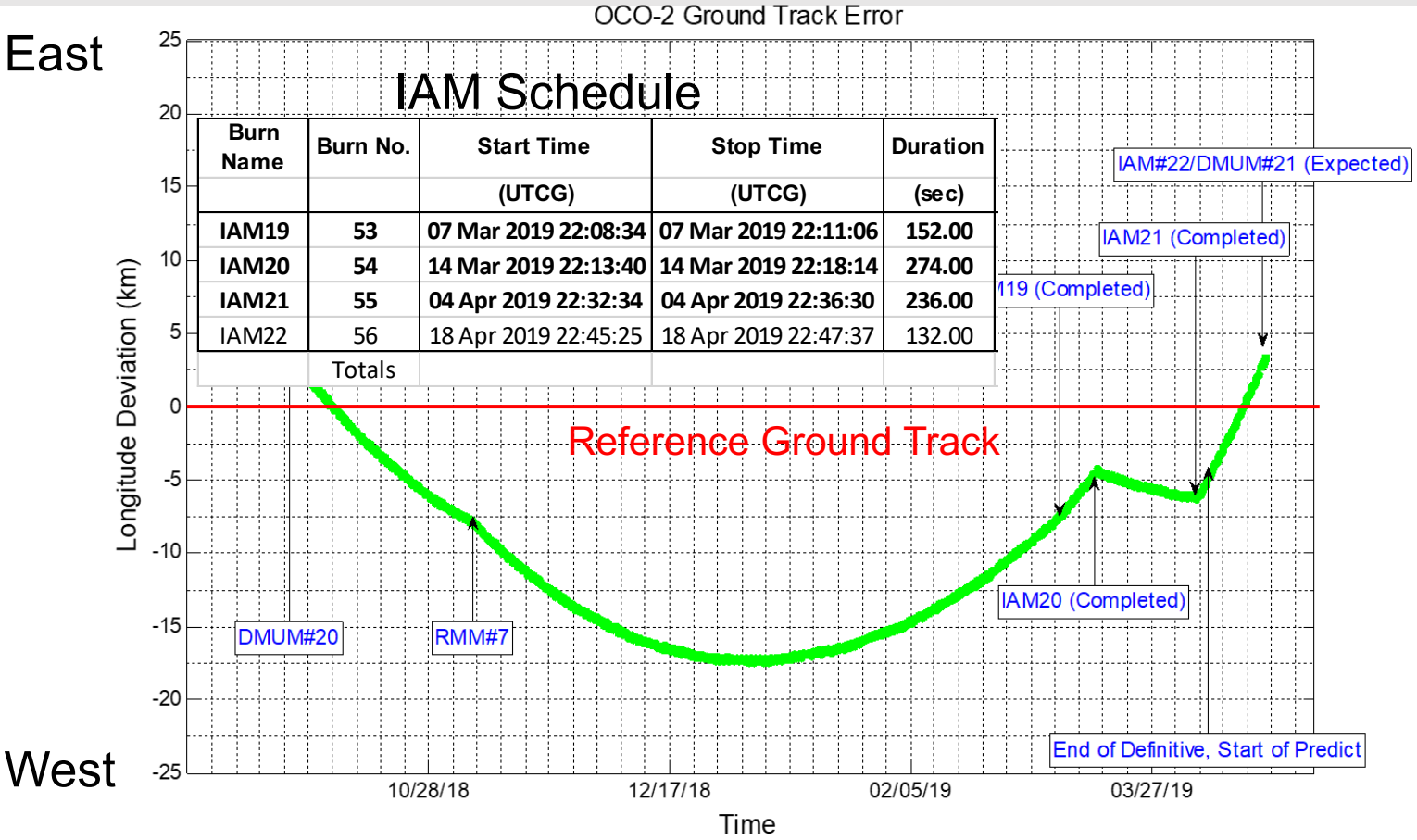
April 16, 2019

OCO-2 Status Summary

OCO-2

- Observatory Status: Nominal
  - Annual Inclination Angle Maneuver (IAM) campaign in progress
    - 3 of 4 maneuvers completed successfully. Last scheduled for 18 April
  - In Work– degradation of z-axis gyro in the inertial measurement unit
- Instrument Status: Nominal
  - Most recent decon - 4 - 11 March 2019 executed nominally
- Science Status: Nominal
  - ACOS/GOSAT version 9 – 2013 Run completed – being analzed
  - “Build 10” testing plan beginning to come together
    - ABSCO 5.1, Solar, and preliminary EOFs generated
    - Daily Aerosol Prior and v10 L1b tests next in line
- OCO-3 Launch and Early Operations Status and Plans
  - Integrated on to the SpaceX Dragon capsule on 20 March
  - Nominal launch date still 25 April

2019 Orbit Inclination Adjust Maneuver Schedule

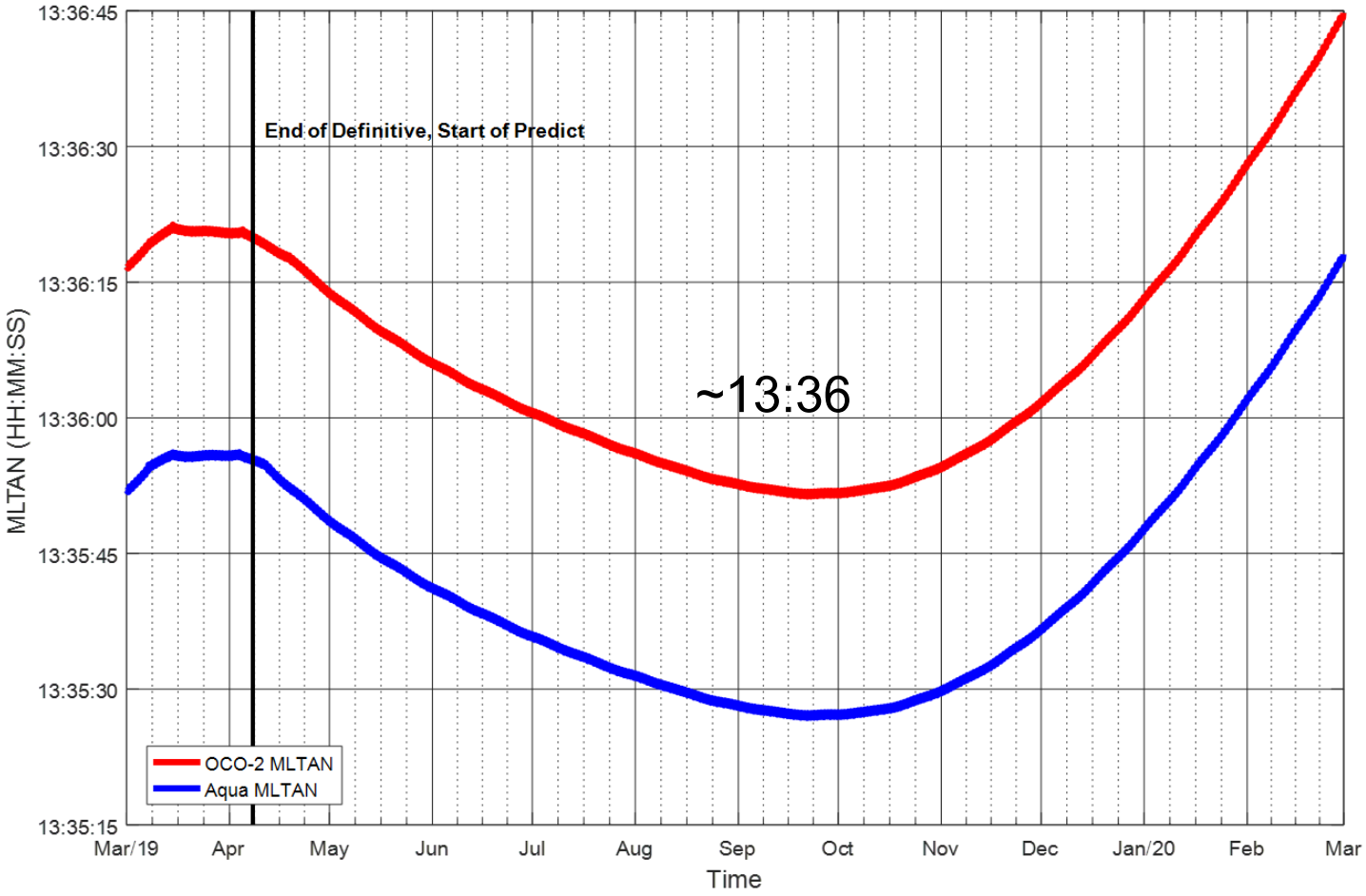


IAM Schedule

Burn Name	Burn No.	Start Time (UTCG)	Stop Time (UTCG)	Duration (sec)
IAM19	**53**	**07 Mar 2019 22:08:34**	**07 Mar 2019 22:11:06**	**152.00**
IAM20	**54**	**14 Mar 2019 22:13:40**	**14 Mar 2019 22:18:14**	**274.00**
IAM21	**55**	**04 Apr 2019 22:32:34**	**04 Apr 2019 22:36:30**	**236.00**
IAM22	56	18 Apr 2019 22:45:25	18 Apr 2019 22:47:37	132.00
	Totals			

OCO-2 is currently ~3 km east of its reference ground track. The last of the annual Inclination Adjust Maneuvers (IAM) is scheduled for 18 April.

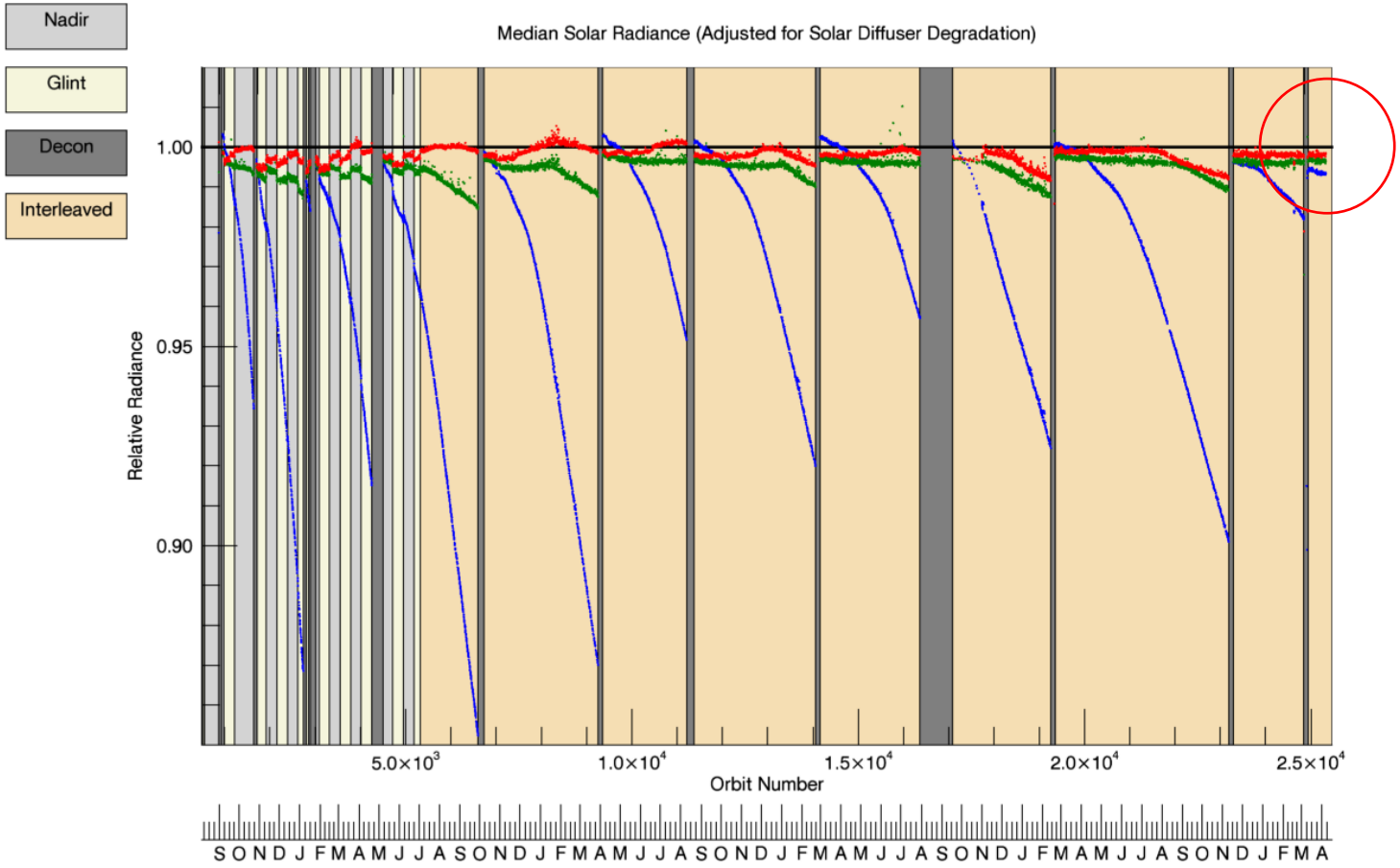
Predicted Mean Local Time After IAM



Inertial Measurement Unit Issue

- The OCO-2 attitude control system uses data from a star tracker, an inertial measurement unit (IMU), sun sensors, and a magnetometer to determine the spacecraft attitude.
- The IMU includes 3 ring laser gyros for monitoring rotation about the spacecraft's x, y, and z axes. The z-axis is gyro is degrading rapidly.
  - The flight software must be modified to remove dependencies on the IMU
  - Meetings with IMU manufacturer planned next week
- Science impacts of the loss of the IMU
  - Will not affect nominal science operations
  - Will preclude future Full Moon Lunar Calibration and Solar Doppler calibration operations due to obscuration of star tracker field of view by the disk of the Earth – neither loss will compromised routine calibration
  - Will also complicate second downlink each day to Alaska Satellite Facility due to solar illumination of the star tracker
    - Other options are currently under investigation

Throughput Trending



The March 4-11 Decon restored the throughput to > 99% in all 3 channels.

Nominal B10 Testing Plan

- ABSCO update - Initial tests completed, nominal ABSCO v5.1 selected
  - Improved residuals. Little if any improvement in bias
- Solar model update – Done – new solar continuum adopted
- Daily aerosol prior and aerosol constraints - Ongoing
- CO_2 prior update (in coordination with TCCON) - Ongoing
- Preliminary L1b (ARP 40/41) test - Ongoing
- Additional L1b calibration updates -revised bad samples, long-term gain trend
- B10 baseline + new L1b + new EOF
- Assess impact of constraining surface pressure (to prior or +/- < 4 hPa)
- Other tests … as time allows

GOSAT v9 Progress

- Before initiating the full 10-year production run, SDOS is running one full year (2013) to validate the production system
- This test has been completed and analysis is beginning.
- If everything checks out, we could be starting the full 10-year production run before end of April

Publications Statistics

As of 16-April-2019:

- 2014: OCO-2: 7 refereed papers, 1 book chapter
- 2015: OCO-2: 8 refereed papers
- 2015: ACOS: 3 refereed papers, 1 book chapter
- 2016: OCO-2: 18 refereed papers
- 2016: ACOS: 12 refereed papers
- 2017: OCO-2: 48 refereed papers
- 2017: ACOS: 2 refereed papers
- 2018: OCO-2: 38 refereed papers
- 2018: ACOS: 4 refereed papers
- 2019: OCO-2: 3 refereed papers

Source: Dave, Crisp, OCO-2 Science Team Lead and http://www.isiknowledge.com (key word: OCO-2 OR Orbiting Carbon Observatory-2 OR Atmospheric CO2 Observations from Space OR ACOS)

Blue text indicates items that have been updated since the last report on 16-Apr-2019

Just Out!

Atmos. Meas. Tech., 12, 1495–1512, 2019
https://doi.org/10.5194/amt-12-1495-2019

Atmospheric Measurement Techniques Open Access EGU

The impact of improved aerosol priors on near-infrared measurements of carbon dioxide

Robert R. Nelson[1] and Christopher W. O'Dell[2]

Atmos. Meas. Tech., 12, 2241–2259, 2019
https://doi.org/10.5194/amt-12-2241-2019

Atmospheric Measurement Techniques Open Access EGU

How bias correction goes wrong: measurement of X_{CO_2} affected by erroneous surface pressure estimates

Matthäus Kiel[1], Christopher W. O'Dell[4], Brendan Fisher[3], Annmarie Eldering[3], Ray Nassar[5], Cameron G. MacDonald[6], and Paul O. Wennberg[1,2]

Atmos. Meas. Tech., 12, 2341–2370, 2019
https://doi.org/10.5194/amt-12-2341-2019

Atmospheric Measurement Techniques Open Access EGU

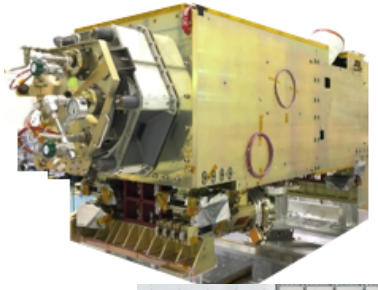
The OCO-3 mission: measurement objectives and expected performance based on 1 year of simulated data

Annmarie Eldering[1], Thomas E. Taylor[2], Christopher W. O'Dell[2], and Ryan Pavlick[1]

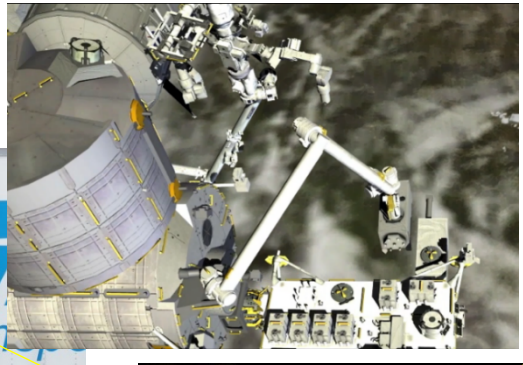

OCO-3 Status

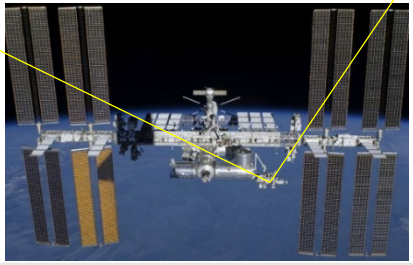
OCO-3 Launch and Science Team Meeting

- Current launch date: No Earlier than 26 April 2019
  - You should have received an invitation from NASA Launch Services. If so, please RSVP immediately. If not LET US KNOW IMMEDIATELY
- The Science Team meeting agenda has been adjusted to accommodate one day launch slip
  - See https://sites.google.com/view/oco2stm0419/home



The OCO-3 Team





Wednesday, April 24

Topic	Speaker	Start Time	end time	duration (HH:MM)	location
Registration and Check in		9:00 AM	9:30 AM	0:30	
Welcome, HQ update, OCO-2 PM comments	Ken J, Mark Dave C + G	9:30 AM	9:50 AM	0:20	Ballroom
Getting ready for OCO-3	Thomas, Ryan, Greg	9:50 AM	10:35 AM	0:45	Ballroom
COFFEE	ALL	10:35 AM	11:05 AM	0:30	
planning for breakouts and plenary	Chip & Dave S	11:05 AM	11:35 AM	0:30	Ballroom
paper planning	Chip & Dave S	11:35 AM	12:05 PM	0:30	Ballroom
lunch	ALL	12:05 PM	1:35 PM	1:30	Ballroom
using OCO-2 and OCO-3 data together (validation)	val team	1:35 PM	1:55 PM	0:20	Ballroom
using OCO-2 and OCO-3 data together (algorithm)	alg team	1:55 PM	2:15 PM	0:20	Ballroom
using OCO-2 and OCO-3 data together (flux)	flux team	2:15 PM	2:35 PM	0:20	Ballroom
using OCO-2 and OCO-3 data together (sif)	sif team	2:35 PM	2:55 PM	0:20	Ballroom
discussion	ALL	2:55 PM	3:05 PM	0:10	Ballroom
coffee break	ALL	3:05 PM	3:35 PM	0:30	
alg report on B10 testing	Chris & Alyn	3:35 PM	4:05 PM	0:30	Ballroom
calibration report	Gary Spiers	4:05 PM	4:35 PM	0:30	Ballroom
science planning	Annmarie & Dave C	4:35 PM	5:10 PM	0:35	Ballroom
mtg wrap up	ALL	5:10 PM	5:30 PM	0:20	Ballroom

Thursday/Friday, April 25/26

Friday

Topic	Speaker		Start Time	end time	duration (HH:MM)	
NOTE - THREE MORNING SESSIONS CONCURRENT			9:00 AM	12:00 PM	3:00	
30 mins Flux + alg + val, then val breakout	Greg+ VAL team		9:00 AM	11:00 AM	2:00	1/3rd of ballroom
clouds	Aronne +		9:00 AM	12:00 PM	3:00	1/3rd of ballroom
local breakout	Eric +		9:00 AM	12:00 PM	3:00	1/3rd of ballroom
lunch			12:00 PM	1:30 PM	1:30	
flux breakout	flux team		1:30 PM	5:30 PM	4:00	Hampton/TBC
GUEST BRIEFING (for friends and family) happens at 3pm in Ballroom			3:00PM			
Reception for everyone			~ 5:00:00 PM			

Friday

LAUNCH at 5:52AM			4:30 AM	1:00 PM	8:30	
launch report + OCO-2 project news			1:00 PM	1:20 PM	0:20	ballroom
flux group summary			1:20 PM	1:50 PM	0:30	Ballroom
clouds summary	cloud team		1:50 PM	2:10 PM	0:20	ballroom
local group report	local team		2:10 PM	2:55 PM	0:45	Ballroom
COFFEE	ALL		2:55 PM	3:25 PM	0:30	Ballroom
flux _ alg _val summary	Odell + Basu		3:25 PM	3:55 PM	0:30	Ballroom
reports from selected science team proposal Pis	PIs		3:55 PM	5:30 PM	1:35	Ballroom

Saturday, April 27

3 MORNING SESSIONS are CONCURRENT		9:00 AM	12:00 PM	3:00	
ABSCO breakout	Vivienne Payne	9:00 AM	12:00 PM	3:00	1/3rd of ballroom
alg breakout (alg + cal for last 30 mins)	Chris+ Alyn	9:00 AM	11:00 AM	2:00	1/3rd of ballroom
SIF breakout	Phillip +	9:00 AM	12:00 PM	3:00	1/3rd of ballroom
lunch		12:00 PM	1:30 PM	1:30	
val summary	Greg +	1:30 PM	1:50 PM	0:20	Ballroom
UQ summary	Jon Hobbs	1:50 PM	2:10 PM	0:20	Ballroom
absco summary	Vivienne Payne	2:10 PM	2:30 PM	0:20	Ballroom
COFFEE	ALL	2:30 PM	3:00 PM	0:30	Ballroom
SIF summary	SIF team	3:00 PM	3:45 PM	0:45	Ballroom
young scientist showcase	see list	3:45 PM	4:15 PM	0:30	Ballroom
paper planning	leads	4:15 PM	4:45 PM	0:30	Ballroom
review of final action items	leads	4:45 PM	5:00 PM	0:15	Ballroom

Key Near Term Activities

Blue text indicates items that have been updated since the last report. Red text indicates that there may be a changes.

Planned Date	Activity Description
26 Apr	OCO-3 Launch, Cape Canaveral, FL
24-27 Apr	OCO-2/OCO-3 Spring Science Team Meeting, Coco Beach, FL
13-17 May	ESA Living Planet Symposium, Milan, Italy
21-22 May	NOAA ESRL GMD Annual Conference, Boulder
3-5 Jun	IWGGMS-15, Sapporo, Hokkaido, Japan
10-12 Jun	CEOS AC-VC, Tokyo, Japan
17-20 Jun	CALCON, Logan Utah
30 Jun-5 Jul	2019 RRV Campaign
7-18 Jul	27th IUGG General Assembly 8-18 July, Montreal, Canada
26-29 Aug 2019	Chapman Conference: Carbon-Climate Feedbacks, San Diego

IWGGMS-15 Activities

- Sunday, 2 June – GeoCarb Science Team Meeting,
  - Hokkaido University, Sapporo, Japan
- Monday – Wednesday, 3-5 June: IWGGMS-15
  - Hokkaido University, Sapporo, Japan
- Thursday, 6 June – GOSAT RA PI Meeting
  - Hokkaido University, Sapporo, Japan
- Sunday, 9 June – CEOS AC-VC/WGCV/WGClimate Roadmapping
  - Nakano Sunplaza, Tokyo, Japan
- Monday – Wednesday, 10-12 June – CEOS AC-VC Annual Meeting
  - Nakano Sunplaza, Tokyo, Japan